LETTERS TO THE EDITOR.

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August Meteor-showers.

The following meteor-showers become due during the month of August:—

Epoch August 12, 4h. 30m., approximately fifteenth order of magnitude. Principal maxima, August 9, 22h. 55m., and August 11, 19h. 15m.; secondary maxima, August 10, 12h. 45m., and August 11, 11h. 25m.

Epoch August 13, 2h. 30m., approximately seventeenth order of magnitude. Principal maxima, August 13, 7h. 50m., and August 15, 4h.; secondary maxima, August 14, 1h. 20m. and 13h. 15m.

Epoch August 15, 8h., seventeenth order of magnitude. Principal maximum, August 16, 20h. 15m.; secondary maxima, August 15, 11h. 50m., 21h. 40m., and August 16, 10h. 25m.

Epoch August 20, 16h., seventeenth order of magnitude. Principal maximum, August 18, 16h. 30m.; secondary maxima, August 17, 8h. 5m., and August 18, 6h. 40m.

Epoch August 17, 9h. 30m., third order of magnitude. Principal maximum, August 18, 20h. 30m.; secondary maxima, August 19, 14h. 10m., August 20, 12h. 45m., and August 21, 10h. 25m.

Epoch August 23, 16h., fifth order of magnitude. Principal maximum, August 22, 9h.; secondary maxima, August 21, 23h. 10m., and August 22, 12h. 55m.

Epoch August 23, 20h. 30m., twenty-fourth order of magnitude. Principal maximum, August 22, 20h. 50m.; secondary maxima, August 20, 0h. 35m., and August 23, 6h. 40m.

Epoch August 25, 21h. 30m., approximately first order of magnitude. Principal maximum, August 25, 8h.; secondary maxima, August 24, 5h. 10m., and August 25, 2h. 55m.

Epoch August 29, 21h. 30m., fourteenth order of magnitude. Principal maximum, August 30, 5h. 30m.; secondary maxima, August 31, 3h. 55m. and 13h. 45m.

Though the meteor-showers of August are somewhat numerous, yet, taken in general, they do not indicate great meteoric intensity, and this remark is true as regards the middle portion of the month, when the Perseid radiant is usually expected to be most active. The most noteworthy maximum in the early part of the month occurs on August 4, 2h. 5m., and other maxima of less intensity belonging to this period that may be particularised are those of August 4, 9h. 55m. and 23h. 45m., August 8, 2h. 40m., and August 9, 22h. 55m. During the middle period, August 10–20, maxima of note occur on August 13, 7h. 50m., August 16, 20h. 15m., and August 18, 20h. 30m. There is considerable meteoric activity also on August 22 and 25.

Early Perseids should be in evidence on the nights of August 2–6, and there are rather weak maxima of these meteors on the nights of August 10–11. The conditions as regards intensity improve on August 14–16, and the Perseid radiant may be found to be considerably, if not most, active on the night of August 16.

John R. Henry.

July 29.

A Flower Sanctuary.

The ravages of plant-raiders, about which Mr. Perrycoste so justly complains in your number for July 25, are a serious and growing evil, and the deplorable effects are felt and seen in almost every accessible part of the realm. I am encouraged to hope that the case of the Cheddar pink is not so crying as that of some other plants, especially orchids and ferns. It is far easier to grow the Cheddar pink from the seed which it produces so freely than to extract the roots thereof from its native limestone chinks. Let us hope that the plants Mr. Perrycoste saw offered for sale were grown for that purpose, just as white heather, once esteemed and hunted up as a rare emblem of good luck, is now grown in thousands by nurserymen, and hawked through the streets of northern towns at a penny a bunch. I do not know to which Thalictrum Mr. Perrycoste refers as suffering from plant-stealers; fortunately the Welsh poppy (*Meconopsis cambrica*) has spread to many districts of the country, and is naturalised far and wide.

In this matter, unluckily, botanists are among the worst offenders, for they reckon a herbarium specimen incomplete unless the root is taken away as well as the inflorescence and seed.

Herbert Maxwell.

Monreith, July 27.

Contrast Colours in the Use of Zone-plates.

These effects would never escape the notice of those who experiment with zone-plates, but perhaps they have not been previously recorded.

A zone-plate is placed at 14 ft. from an electric glow-lamp; 6 ft. further on a red image of the filament is formed, which is conveniently observed with a microscope eyepiece. As this is moved away from the plate there follows in view a continuous succession of images in all the colours of the rainbow. The chromatic dispersion extends along the general axial line through more than 6 ft. Whatever may be the colour of the filament, the groundwork of the circle of illumination assumes the complementary colour. It is surprising to observe how strong is the yellow field impressed upon the eye, while the violet image is growing imperceptible.

W. B. Croft.

Winchester College, July 24.

LORD MERSEY'S REPORT ON THE LOSS OF THE "TITANIC."

The proceedings of the Court, over which Lord Mersey presided as Wreck Commissioner, extended over thirty-seven days of public sittings, at which ninety-seven witnesses were examined, a large number of documents, charts, and plans were produced, and a great mass of facts and evidence was accumulated in connection with this "formal investigation" of the circumstances attending the loss of the *Titanic*. On the basis of these materials Lord Mersey, with the aid of five assessors, has produced a report in which twenty-six questions formulated by the Board of Trade are specifically answered. These questions "deal with the history of the ship, her design, construction, size, speed, general equipment, life-saving apparatus, wireless installation, her orders and course, her passengers, her crew, their training, organisation, and discipline; they request an account of the casualty, its cause and effect, and of the means taken for saving those on board the ship; they call for a report upon the efficiency of the Rules and Regulations made by the Board of Trade under the Merchant Shipping Acts, and on their administration; and finally for any recommendations to obviate similar disasters which may appear to the Court to be desirable." The field of inquiry thus opened was very extensive; many of the questions involved matters of personal responsibility and conduct; even as regards matters of fact there were considerable differences of opinion and evidence, as was inevitable in the circumstances. All who followed the course of this difficult and prolonged inquiry must have been impressed with the firmness, impartiality, and judicial ability displayed by Lord Mersey throughout the proceedings. His readiness to accept any valuable contributions of fact or personal opinion from those qualified to assist the Court; the summary but thorough manner in which questions of a personal nature—especially those affecting Mr. Bruce Ismay and Sir Cosmo and Lady Duff-Gordon—were dealt with; the frank announcement of decisions reached by Lord Mersey on certain points at comparatively early stages of the investigation, and the consequent saving of time; the courage with which attempts to give disproportionate importance to side issues or to class interests were rendered futile; the patience and fairness with which many of the witnesses, especially those of the seaman class, were treated and their evidence made clearer; the mastery of technical details displayed; and many other characteristics of procedure which cannot be mentioned, gave distinction to this memorable inquiry, and demonstrated the great advantages secured by the selection of an experienced judge as Wreck Commissioner. Long as the proceedings lasted, it could not be said that there was any avoidable waste of time, unless it occurred in the speeches of counsel. Great industry must have been applied to the analysis of the evidence and the preparation of the report; otherwise it could not have been produced so promptly. There are, however, no traces of haste or lack of mature consideration in its contents and recommendations; it epitomises the history of the *Titanic* and makes clear the causes of her loss; it contains valuable suggestions for increasing the safety of life and property at sea, and in other ways is a most important and valuable document.

The report proper is one of the briefest ever made: it runs as follows: "The Court, having carefully inquired into the circumstances of the above-mentioned shipping casualty, finds, for the reasons appearing in the Annex hereto, that the loss of the said ship was due to collision with an iceberg, brought about by the excessive speed at which the ship was being navigated." The annex to the report is a closely reasoned and highly condensed document of more than seventy foolscap-sized pages of print, and well deserves careful study. There has been some criticism of the "form of words" used in the report proper, but most people will be disposed to regard it as hyper-criticism, and to concur with the view that the loss of the ship was primarily due to the extremely high speed (twenty-two knots) which was maintained after it was known that the *Titanic* had entered upon a region where icebergs and ice had been reported to be present by means of wireless messages sent from other ships and received on board the *Titanic*. Some of these messages, including one or two of the most important, do not seem to have been handed to the captain or officers of the *Titanic* by the operator in charge of the Marconi apparatus. This ought not to have happened, and any similar occurrence should be made impossible in future; but Lord Mersey shows conclusively that Captain Smith and his chief officers "all knew on the Sunday evening that the vessel was entering a region where ice might be expected." In such circumstances, adds Lord Mersey, "I am advised that with the knowledge of the proximity of ice which the master had, two courses were open to him: the one was to stand well to the southward instead of turning up to a westerly course, the other was to reduce speed materially as night approached. He did neither." In face of the evidence given by experienced seamen, long engaged on the trans-Atlantic service to New York, Lord Mersey admits that the captain of the *Titanic* only did what has been usually done for a long period, in holding to the usual course and maintaining full speed, and states that this common practice on the New York ocean routes had not been accompanied by casualties. It is well known that this year ice has been met much further south than it is ordinarily found at the season when the *Titanic* was lost. Lord Mersey tersely sums up his conclusion in the statement that Captain Smith "was exercising his own discretion in the way he thought best. He made a mistake, a very grievous mistake, but one in which, in face of practice and of past experience, negligence cannot be said to have any part; and in the absence of negligence it is, in my opinion, impossible to fix Captain Smith with blame." So much for the past; as to the future, Lord Mersey significantly adds: "it is to be hoped that the last has been heard of the practice [*i.e.*, maintaining full speed in a region where ice is likely to be met], and that for the future it will be abandoned for what we now know to be more prudent and wiser measures."

It may be interesting to illustrate what the high speed above mentioned involved in the case of the *Titanic's* approach to and collision with the iceberg, although this section of the annex to the report had been to a great extent anticipated by an analysis of evidence given before the Senatorial Committee in the United States. About thirty-seven seconds only elapsed between the moment when the iceberg was first sighted and that when collision took place. That collision caused damage to the bottom of the starboard side of the vessel, about ten feet above the level of the keel: the damage extended over a length of about 300 feet from the bow, and in consequence of the high speed, it was done in about ten seconds. In other words, the fate of the great ship was sealed in less than one minute from the moment when the iceberg was sighted from the "crow's nest" on the foremast. Her fate was sealed, because the nature and longitudinal extent of the injury threw open to the sea more than one-third of her length, and destroyed the watertight subdivision of that portion of the vessel. In the annex it is stated that the transverse bulkheads which formed the watertight partitions of the *Titanic* in the damaged forward portion were so spaced that if the four foremost compartments had been simultaneously flooded, she might have remained afloat; but when the forward boiler-room was also flooded the ship necessarily foundered. According to the standard of subdivision hitherto accepted as sufficient for mercantile steamships, it would have sufficed to have made provision to keep the *Titanic* afloat when any two compartments were flooded simultaneously. It will be seen, therefore, that the accepted standard was considerably exceeded in the great ship; but in consequence of her loss it is obvious that there must be a reconsideration of that standard and of the methods of subdivision to be adopted in future. Transverse watertight bulkheads have been preferred for most mercantile steamships up to the present time; they were used almost exclusively in the *Titanic*. Horizontal watertight partitions and longitudinal vertical watertight bulkheads are commonly employed in warships, and have been used in a few passenger steamers in association with transverse bulkheads. It seems probable that a similar practice will find favour in mercantile marines after what has happened. A strong departmental committee has been appointed by the Board of Trade and is now at work. Lord Mersey recommends that this committee should deal with the whole subject, and it may be anticipated that this course will be approved.

Boat equipments and life-saving appliances in passenger and emigrant vessels have been extensively criticised and discussed since the *Titanic* was lost. It came as a shock to the general public to be told that the provision made in that ship, in the form of boats and rafts, was only sufficient for the accommodation of one-third of the total number of souls she was licensed to carry by the Board of Trade, and that the boats, &c., actually carried by the *Titanic* were considerably in excess of the accommodation required by the official regulations. Yet these facts were well known to all persons familiar with the mercantile marine, and with shipping legislation; and the arrangements were not considered unreasonable, because losses of life in ocean-going passenger steamships over a long period of years had been trivial. Moreover, great practical difficulties stood in the way of making larger provision for boats and rafts which could be so installed as to ensure their efficient use in case of emergency, under ordinary conditions of weather at sea. A cry went up in the Press demanding the immediate provision of a minimum number of boats and life-saving appliances (rafts, collapsible boats, &c.) which should ensure accommodation for every human being who might be carried in any ship under her Board of Trade certificate. Lord Mersey's Court was instructed to consider and report on the existing rules and regulations of the Board of Trade. Section 6 of the annex deals with that subject, tracing the history of the regulations in detail and giving the reasoning on which they have been based. Lord Mersey's conclusions may be summarised as follows: Boat accommodation should, where practicable, be carried in future for all on board passenger and emigrant steamships; the officials of the marine department of the Board of Trade were blameable for omitting, during many years, any revision of rules made in 1894 for the boat equipment of ships, although there had meanwhile been an enormous increase in the dimensions and tonnage of passenger steamships. These rules are now under consideration by an advisory committee of shipowners and others appointed by the Board of Trade, and it seems probable that a sensible increase will be made in the statutory minimum for boat accommodation, although the provision recommended by Lord Mersey may not be enforced. In the annex to the report it is made clear that although only 711 persons were saved in the boats of the *Titanic* out of 2201 persons on board, the total accommodation of the boats carried was sufficient for 1178 persons. Furthermore, it is stated that at the time of the collision there was a dead calm, and exceptionally favourable conditions, which enabled the boats to be lowered in safety and to be navigated without danger until the *Carpathia* arrived. One other fact must be mentioned. Modern passenger steamships of the largest dimensions have their boat decks situated from 60 to 70 feet above water, and consequently the most moderate rolling motion of the vessels would make it impossible to lower the boats safely from that great height, while passengers would necessarily find it difficult and dangerous to enter the boats when swinging at the davits. These and other important features of the problem must be considered by the advisory committee before fresh rules are framed, and it is fortunate that members of the committee have practical knowledge of the working conditions in sea-going ships. This is obviously not a subject for amateur legislation. It is understood that revised regulations will be submitted to Parliament by the President of the Board of Trade during the autumn session, in accordance with the Merchant Shipping Act.

The final recommendation made by Lord Mersey is perhaps the most important, and it deserves quotation in full:—

"That (unless already done) steps should be taken to call an International Conference to consider and as far as possible to agree upon a common line of conduct in respect of (*a*) the subdivision of ships; (*b*) the provision and working of life-saving appliances; (*c*) the installation of wireless telegraphy and the method of working the same; (*d*) the reduction of speed or the alteration of course in the vicinity of ice, and (*e*) the use of searchlights."

There is good reason for believing that such an international conference will be arranged, and its action should be of great benefit to the mercantile marines of the world, which are and will remain necessarily in competition with one another, but should not carry on that competition in a manner likely to be prejudicial to the safety of life and property at sea. If the loss of the *Titanic* should bring about a better understanding and the universal acceptance of principles which will add to the security of ocean navigation, the lessons learnt from that terrible disaster will be of permanent value.

THE DISCOVERY OF HUMAN REMAINS AT CUZCO, PERU.

THE Yale expedition to Peru has made an important discovery of human remains in the vicinity of Cuzco, which are described in the April number of the *American Journal of Science*. We have, first, a full report of the circumstances of the "find" by the director of the expedition, Mr. Hiram Bingham. Following this, Mr. I. Bowman contributes a very cautious and well-considered report on the geological position. He comes to the conclusion that the beds in which the remains were found belong to a glacial series; that the bones were deposited during a period of pronounced alluviation; that since their deposition they were overlaid by from 75 to 100 ft. of gravel, and were at a later period partially eroded. Though at first sight the immediate surroundings suggest the occurrence of a landslip, this view does not commend itself to him, and he provisionally estimates the age of the remains at from 20,000 to 40,000 years.

The anatomical material consists of fragments of a cranium, portions of ribs, the right *os innominatum*, one complete and one imperfect femur. Mr. G. F. Eaton's report indicates that this femur falls within the range of femoral variation in normal male adult Peruvians of the later Inca period. The remains were accompanied by a portion of the tibia of a wolf or wolf-like dog, closely resembling a small gray wolf, *Canis occidentalis*. It may be remarked that three varieties of breeds of domestic dogs are known to have existed in Peru during the later Inca period—a small-sized breed of the bulldog or pug type, with a short snout and undershot jaw; a small house-dog like the dachshund, with slender snout; and a larger, slender-limbed variety, with wolf-like skull, originally classed by Tschudi under the name *Canis ingae pecuarius*. The two latter types are supposed to be descended from a larger wolf-like variety, itself derived from the American wolf. Thus the presence in this site of a large wolf-like dog, while it offers in itself no proof of great antiquity, does not render that supposition untenable.

But, besides the canine remains, those of what seems to be a bison have also been found; the study, however, of these rib fragments cannot differentiate the bison from domestic cattle. According to Mr. Eaton, if the Cuzco remains date from a period preceding the Spanish Conquest, it would appear that the bovine remains belong to some species of bison, for no other feral group of the bovidæ need be considered. The difficulty remains that though the Spaniards found captive bison at Montezuma's capital, the American bison in the free state is not known to have ranged further south than north-eastern Mexico.

The existence, therefore, of the associated canine and bovine remains raises considerations not easily reconciled with the geological environment, and for the present the exact age of the Cuzco remains must continue to some extent to be uncertain. It is much to be desired that further examination of this promising site may lead to the discovery of further evidence on which a final decision may be safely based.

THE LATE MR. A. O. HUME, C.B.

MR. ALLAN OCTAVIAN HUME, whose death took place at his residence in Upper Norwood on July 31, at the age of eighty-three, ranks as one of the chief benefactors to the natural history departments of the British Museum. During the latter portion of his career (1849 to 1882) as a Bengal civilian, the deceased gentleman devoted his leisure and much of his fortune to collecting skins and eggs of Indian birds and heads of Indian big game. The result was the bringing together of a collection such as had never been made before, including, as it did, not only specimens obtained by himself and his assistant, Mr. W. R. Davison, but many purchased from other collections. Except for a selection of specimens—chiefly big game—retained for his own lifetime, but ultimately to come, we believe, to the nation, this collection was presented to the British Museum between 1885 and 1891. Previous to this the Museum collection of Indian birds was poor, whereas now it is surpassingly rich.

The total number of skins and eggs of birds added to the Museum collection was 75,577, of which 258 were types. The big-game collection comprised 223 specimens, in addition to which were 371 mammal skins, including several types.

Mr. Hume started and for fifteen years maintained *Stray Feathers*, and was also author or co-author of several other works on Indian ornithology. To kind attention received in the 'seventies at Mr. Hume's Simla residence, the present writer owes his recovery from severe illness. R. L.

NOTES.

THE second International Congress of Entomology was opened at Oxford on Monday last, under the presidency of Prof. E. B. Poulton, F.R.S., and is still in progress.

A COMMITTEE has been appointed by the President of the Board of Trade to advise him, in the interests of safety of life at sea, with regard to methods of stowing, launching, and propelling ships' boats, and other kindred matters. Prof. J. H. Biles is the chair-